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Interactive Multimedia Development Based on Discovery Learning for Unimed Indonesian Literature Students

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Abstract:- In this situation that is a problem with the Covid-19 pandemic which affects all human beings in the world and touches all levels of society as well as disrupting all activities of life. The world of education is an activity whose process is almost paralyzed due to the Covid 19 pandemic, all drivers of the world of education must rack their brains to find ways to keep the learning process going and students must still have their rights to feel the learning process that does not decrease. One of the things that can be done by lecturers or teachers as facilitators and those in charge of transferring knowledge even though in an indirect way is to use a medium that does not reduce student interactivity even though it is not in a class forum. This study aims to produce Interactive multimedia products based on discovery learning concepts that are packaged into interactive CD by using Adobe Professional CS6 software and knowing the feasibility level of the media used, knowing the increase in the ability to understand concepts and writing skills of students after using interactive multimedia based on discovery learning concepts. This research uses research and development method by applying the DDD-E design model which consists of four steps, namely: Decide, Design, Develope and Evaluate. The results of the validation and research results indicate that interactive multimedia based on the discovery learning concept developed is feasible, efficient and effective in improving student learning outcomes.This study aims to produce interactive multimedia products and test their feasibility and effectiveness.The discovery learning model that has been tested and has succeeded in increasing student motivation and learning outcomes in the classroom, through interactive multimedia that researchers have developed, the discovery learning model is packaged into interactive media that can be accessed by students on line and offline without reducing the pleasant learning atmosphere. and interactive. Because at this time learning is still running online and cannot be done directly on campus, so this interactive multimedia can be a way out to help lecturers transfer their knowledge.

Keywords:- *Interactive Multimedia, Discovery Learning, Exposition Text, Adobe Professional CS6.*

I. INTRODUCTION

The emerging economies of developing nations have a great need to ensure the continued development of their workforce as a means to support greater economic growth (Berger & Fisher, 2013; Benhabib & Spiegel, 1994; Hanushek & Kimko, 2000). To that end, globalization has greatly increased the need to meet world class standards in vocational and technical training (Arwizet, Jalinus & Rizal, 2019). In the current economy, it is not just a matter of competing training and vocational schools, but rather the quality and results (Nurhaeni, Nugroho & Kusumawati, 2019). This is because the graduates of these schools will be competing against the graduates of other nations, such as China and South Korea, and therefore it is an interest of government to ensure that this vocational training is top quality (Nurhaeni et al., 2019). This is a challenge for many nations, as education approaches have not kept pace with developments that relate to the advancement of technology (Mok, 2006; Sadiman, 2004)). As with other nations with emerging economies, Indonesia's stakeholders in business and government seek to increase the quality and performance of the labour pool. This is best achieved through high quality training (Wolf et al., 2006; Blomström & Kokko, 2002). The Centre for Industrial Training in North Sumatra in Indonesia is one such vocational training school which faces these challenges, and this include the electrical power technician program. It is the training program for the electrical power program at the Centre for Industrial Training. This study sought to discover whether an internal team could work collaboratively to develop a digitally based learning tool for training the trainers in the electrical power program. Assessment was determined by subject matter and instructional experts.

Education has been fundamentally changing because of access to new technologies (Collins & Halverson, 2018; Selwyn, 2015). Educators and education leaders have been encouraged to find more ways to increase the use of technology in the classroom, as a means of improving teaching but also a means of increasing the exposure of students to technology (Dotong, De Castro, Dolot & Prenda, 2016). This study is significant because currently there is trepidation in Indonesia and much of Southeast Asia in

relation to education and technology (Felker, 2013; Kanbur, Rhee & Zhuang, 2014). In fact, some studies have reported that of all the Asian countries, Indonesia has been distinctly in last place in relation to the development of digital literacy (Orange, Seitz, & Kor, 2012). South Korea, on the other hand, is considered to be the leader in this area (Grzybowski, 2013). There continues to be a digital lag, as well as a considerable digital divide (Azali, 2017; Rodrigo, Baker & Rossi, 2013). The digital divide in Indonesia has a dual axis, that being the urban-rural divide, as well as the generational divide (Azali, 2017; Sujarwoto & Tampubolon, 2016). In general, younger persons in urban areas are the most likely to have higher levels of digital literacy, while those who are older and in more rural or isolated areas tend to have lower levels of digital literacy and require support (Azali, 2017). Digital literacy in Indonesia has, however, reached a threshold of competency (Puspitasari & Ishii, 2016; Sabani, Deng & Thai, 2018; Wang & Liu, 2018). It can be assumed that digital literacy in Southeast Asian contexts such as Indonesia has now reached the point where digitally based learning is now possible, however what is missing is the language appropriate digital learning materials (Anshari, Alas, Hardaker, Jaidin, Smith & Ahad, 2016; Yim, Moses & Azalea, 2019). There is a widespread belief in the perspective that digital technologies can only be developed by specialists, and that it is more difficult therefore to create Indonesian language, as well as local language-based digital applications for learning (Hidayati & Wuryandari, 2012; Manning & Bucher, 2013). This study is significant, but it intends to be a proof of concept that technology facilitates the use of technology, which can support learning needs, student outcomes and reducing limitation or bottlenecks such as the availability of instructors and the appropriateness of language.

The objective of this study was to determine whether a technology-based approach to training for vocational instructors could be designed and delivered successfully using mostly instructors of future trainers to drive the development of a digital delivery format. In order to determine this, the study involved the development of an interactive digitally-based training delivery system which could be used independently by the trainers. This could therefore facilitate the development of many instructors, who are better able to raise the skills levels of more Indonesian students in vocational schools (Hasibuan & Santoso, 2005). For this preliminary study, success was determined by a review of experts in the subject matter and the instruction of the subject matter.

Many countries in Southeast Asia are finding that meeting the needs of the emerging economy has been limited by the available skilled labour force (Brook & Long, 1999; Nevins & Peluso, 2018) . Some of the greatest barriers to increased skill level and labour capacity are that there are only so many instructors and trainers. Further, it is not so easy to train the trainers. This therefore is a major impediment to the general skill level of the population, and with greater capacity through a greater number of instructors, there could be an exponential increase in the quality and abilities of the Indonesian work force, with positive implications for the nation. For the most part, despite advancements in technology and the delivery of pedagogy, the main approach in Indonesia continues to be the use of printmedia.

While considered outdated in some geographic locations, print media remains the main tool for learning in training and education in Indonesia because it is well understood and easy to develop and implement. There are therefore few supports for technology-based educational tools. The use of digital media has been greatly facilitated in recent years, with tools that vary according to the level and the effort that is required for the creation of digital instruction media. These have included presentations made with Prezi and PowerPoint, WordPress templates, quizzes using Google Forms, game creation applications and a multitude of other interactive possibilities using free or easy to access software (Cole & Weber, 2019; Martin, López-Martín, Lopez-Rey, Cubillo, Moreno-Pulido & Castro, 2018).

Training design involves the creation of systems which systematically deliver to the student the lessons and assessment that, when followed, results in competency (Cole & Weber, 2019). It is therefore necessary to consider training as a systematic process. Digital formats allows for guiding students through learning pathways in a systematic way. Many studies describe that digitally delivered learning materials can often achieve better student performance though greater engagement and motivation through more creative presentation and structure of lessons ((Cole & Weber, 2019; Muruganantham, 2015). Achieving such goals, however, requires effective design, often beginning with the translation of print materials to a digital format (Cole & Weber, 2019; Muruganantham, 2015; Van Laar, van Deursen, van Dijk & de Haan, 2017). Digital literacy of the students, however, is a precondition of success (Mohammadyari & Singh, 2015; Tang & Chaw, 2016). As with many developing contexts, digital formats are not as commonly used, and digital literacy tends to be lower than in developed contexts (Binyamin, Rutter, & Smith, 2018; Kanwal & Rehman, 2017; Salloum, Al-Emran, Shaalan & Tarhini, 2019). Even though the digital age has been slower in permeating Indonesian society, there has been increasing use of the internet and smartphones, and a growing level of comfort with technological devices (Divayana, 2017). While digital literacy is improving, many Indonesians continue to have little or no exposure to digital based technologies based on economic factors that determine access to computing materials (Guillén & Suárez, 2005). On one hand, there is a significant part of the population with sufficient digital literacy skills to convert to digitally based instruction. On the other hand, many will continue to need support. In particularly, cultural areas with poor understanding of the national Indonesian language requires significant supports in the form of language customization, which has the potential to vastly improve access to learning materials and their availability.

The ADDIE model is a progression of development based on five phases that is commonly used by training designers to ensure the effectiveness of the resulting training (Patel, Margolies, Covell, Lipscomb & Dixon, 2018). In the ADDIE model, this systematic way of working always refers to the general stages of training development system (Patel et al., 2018). The five stages are analysis, design, development, implementation, and evaluation, and the model is widely used globally as a standard (Nedungadi, Ramesh, Pradeep, & Raman, 2018; Patel et al.,

2018). The ADDIE model has been used in a variety of settings, from training of education staff (Astuti, 2019), hard sciences (Gusmida & Islami, 2017), and even practical nursing (Hsu, Lee- Hsieh, Turton & Cheng, 2014). The ADDIE system is limited in its relative inflexibility and the difficulties that arise when applying it to smaller projects (Kruse, 2009).The ADDIE systems allows for more creative training modules which provide the means for a more creative and innovative learning experience that ensures students are motivated and interested in learning (Hess & Greer, 2016; Khalil & Elkhider, 2016).

Something that is important to realize about the ADDIE model is that it is well suited for the creation of digital software delivery methods for training and education (Connelly & Miller, 2018; Chew, Hamid, & Madar, 2017). Further, there is evidence to indicate that smart technology, such as software designed using the ADDIE model, can lead to more effective teaching and learner retention (Connelly & Miller, 2018). Software delivery helps to ensure that the cognitive effort needed can be efficiently managed through schema development which facilitates learning and improves learner outcomes (Connelly & Miller, 2018). This also allows for an innovation in both teaching and learning, since the digital delivery can be implemented as it is convenient for the student, but with the best aspects of the highest quality instructors. There is therefore potential for non-traditional learners, who are unable to meet the needs of a vocational school training schedule because of family, work or other responsibilities.

The conceptual framework for the process was grounded theory, to the extent that the results of one phase informs the next phase (Chong & Yeo, 2015). Grounded theory is a process which was developed by Glaser and Strauss (2017), involving specific questions, but without specific criteria for responding to those questions. Instead, the criteria was determined from the process of study itself (Chong & Yeo, 2015; Thornberg, 2017). Grounded theory has been increasingly used in training development, as it allows the flexibility for basing a development on a discovery yet to be made, such as the perspective of a certain target group or segment (Teräs & Kartoğlu, 2017; Urick, 2017). It is especially appropriate to mixed method approach based on the opinion or perspective of a certain group such as subject matter experts (Guetterman, Babchuk, Howell Smith & Stevens, 2017). Analysis using descriptive statistics provides a time-honoured way of simply communicating outcomes of an evaluation.

The instructional objectives had two levels. The first level was to meet the instructional needs of instructors in training (McKenzie et al., 2000). It could be noted that secondary instructional objectives existed in relation to the students who would then be taught by the instructors. The second level of instructional objectives was in relation to a model or blueprint of a process for adding value to teaching approaches through customized development of technological application supplements. To that end, the primary instructional objectives were inward looking and focused on organizational capacity and development.

II. METHODS

This mixed methods study used a repeated survey data format using a sample of subject matter and instruction experts, and a separate evaluation of a control and experimental sample of train the trainer students. The survey of 29 experts using a sample panel established important assessment ratings relating to the needs of instructors of electrical power vocational training at the Centre for Industrial Training. The assessors had access to computers and the internet and had previously demonstrated their familiarity with the materials, and both the instructional delivery and the survey were delivered digitally. The convenience sample was necessary due to the very specific knowledge and experience needs of the assessment. Those chosen in the sample differ from the general population in that they likely hold far more advanced computer knowledge. This therefore makes the study difficult to generalize accurately to the larger Indonesian population. The students were also a convenience sample, and the archival final exam data for the previous year was used to compare to an experimental group which had access to the CD Rom learning application during their course. The CD Rom's contents did not differ significantly from the course administered to the students from whom the final exam data was initially collected.

In the first phase, a needs assessment and evaluation were conducted in order to better understand what competencies were needed by trainers, the identification of challenges. and the tasks and assessment that were expected (Songhori, 2008). By doing a needs assessment, identifying problems, and performing analysis tasks, it was possible to define what was needed for a training program for trainers, as well as the specific components they would require to adequately prepare. The instructional objectives of the application under development were determined through using the ADDIE stages to define that which was important and required a focused attention (Jones, 2014). At early stages these were generally defined as a digital learning innovation which would be more interesting to trainers in meeting their continuous learning needs, more effective in terms of use of time and outcomes, a high-quality experience and leading to new instructional opportunities with fewer limitations. The features and characteristics which were identified in the design phase included ease of navigation, cognitive aspects of presentation, media integration, aesthetic aspects, functionality and the capacity to meet learning needs, among others. The idea was to better

understand how trainers in this context learn, and what they learn. Analysis at this stage used descriptive statistics. The sample involved in this phase were ten trainers in the electric power industry chosen based on their previous experience and familiarity with the subject at hand. Each trainer used the instructional media, and then provided an assessment based on the survey requirements. The results of this phase informed the design.

In the second stage, the media was designed and developed for the actual training. This involved the collection of the print materials that were typically included in the classroom format, the outline for lessons, the curriculum outcomes and others. It was at this time that the training goals and objectives were first formulated, mostly as a synthesis of the existing materials, but also as a result of discussion and challenging the existing material. Evaluation goals were also developed at this time, with a strong and practical focus on the proving that it is possible to develop such a tool, and that it has instructional value. Once the design had been completely determined and laid out, as well as the education pathways through the material, then the development phase was ready to begin.

Based on these findings from the Design phase, an interactive media presentation process was developed for the delivery of the curriculum. The digital format for learning about electrical power included simulations, animations, audio, video, and images. There was interactivity which allowed for self-testing and moving forward through the digital framework for learning, as well as interactive components for the actual learning modules. The specification for the development used a presentation format with progression pathways that was packaged to a CD Rom, a format which has been found to help increase focus and motivation, as well as cognitive models that help to conceptualize theory and themes. There was some user testing to ensure functionality, however the evaluation of content and goals was reserved for the evaluation phase.

The implementation, for the purposes of the study, was the use of the training module by the student sample. The intention, of course, was for the implementation of a validated digital instruction program to student. Ideally, assessment and evaluation in the next phase would show that the module was effective in achieving student learning objectives.

The informed consent of all parties was gathered before the research was conducted. The anticipated output to be generated was an outline of training for trainers, including the gap analysis, needs identification, and detailed tasks which are required based on those needs. To achieve this there were two evaluations. The first evaluation was conducted by a sample composed of an expert panel of 29 trainers and instructors, while the other evaluation was conducted using the final scores of 12 students in the traditional classroom format, and another 12 students who used the learning application as a supplement in the traditional classroom setting, using its content in conjunction with the course materials as they saw fit.

A sample of 29 training experts with instruction experience composed the first evaluation phase, responding to a survey instrument of pre-identified criteria. The assessment intervals for the response scale is identified in Table 1 below.

Table 1: Interval Assessment Criteria

INTERVAL	CRITERIA
81 % ≤ score ≥ 100 %	Very Good or Strongly Agree
61 % ≤ score ≥ 80 %	Good or Disagree
41 % ≤ score ≥ 60 %	Enough
21 % ≤ score ≥ 40 %	Less good or less Agree
0 % ≤ score ≥ 20 %	No Good or Disagree

The second convenience samples were sourced from archived student achievement data in the previous year on final exam scores for 12 students of the train the trainer module, which was used as a baseline for assessing the final exam scores of the 12 student trainers who had taken the class with the first version of the learning application as a core aspect of the course.

III. RESULTS

The results are divided into the two evaluation phases by stakeholder groups- the instructors of trainers, and the students who hope to become instructors in this area. It is important that neither group be left out. A course which is evaluated only by students may miss the points of learning objectives, while evaluation only by instructors leaves out the student experience and the extent to which the student felt supported in meeting learning objectives.

The expert validation for the most important aspects of the learning software were determined to be the instructions for use of the application, the ease of use, and the structure and practicality. None of the areas of assessment of instructions, ease of use, or structure and practicality received low marks, however there was a resulting ranking of results that were found to be of the highest quality. This speaks to the quality of the subject material. The instructions and the ease of use received very good rankings, for example, while the practicality and structure received only a Good rating. This may be overcome in future studies by using pre-existing templates for learning applications that are pre-validated and now widely available. Other areas for improvement, despite meeting sufficiency criteria, were the recency of materials, and practical aspects of use. Updating the program to be used with a tablet, with more recent materials, would therefore be a future consideration. The results reported by the subject experts can be found in Table 2. Overall, it would appear that the learning application met the expected standard in relation to the identified criteria.

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Table 2: Validation results of expert aspects

STATEMENT	EXPERT	AVERAGE			CATEGORY
	I	II	III		
Instructions for use application program	4	5	5	90%	Very Good
Ease of use program	4	5	5	90%	Very Good
Structure and practicality of application program	4	4	4	81%	Good
Clarity of learning objectives statement	5	5	4	90 %	Very Good
The suitability of the content / materials with the aim	4	5	4	87 %	Very Good
The suitability of the content / materials with the curriculum used	4	4	4	80 %	Good
Instructions and application guides the use of the content / materials	4	5	5	90 %	Very Good
Exposure limits on the concept and content of materials	4	5	5	90 %	Very Good
Giving examples and illustrations	3	5	5	87 %	Very Good
Recency of the content/material presented	4	4	4	80 %	Good
Ease of understanding the language used	4	4	5	87 %	Very Good

The next step in the evaluation was focused on the content aspects. As with earlier scores, all identified criteria were met at Good (suitability and recency) and Very Good (clarity, aim, pathway navigation, exposure limits, provisions of example and ease of language understanding). Again, while this indicates certain areas are an opportunity for further improvements and all criteria may benefit from further refinement, overall the learning application was able to meet all content criteria to the expectations of content and instruction experts. Continued improved in all areas is intended.

Table 3: Validation results expert on aspects of visual, design and aesthetic aspects

STATEMENT	EXPERT			AVERAGE	CATEGORY
	I	II	III		
Quality exposure to content / material presented	4	5	4	87 %	Very Good
Mechanical and systematic presentation of the content / materials	3	4	5	80 %	Good
The use of colours on screen display (screen)	4	4	5	87 %	Very Good
The composition of the text used	4	5	4	87 %	Very Good
The composition of graphics and images presented	3	5	4	80 %	Good
Quality video/audio	4	4	5	87 %	Very Good
Ease of understanding the information presented	4	5	4	87 %	Very Good
The use of directional keypad / controller	4	4	5	87 %	Very Good

The validation results were important to providing evidence that a digital instructional tool can be developed using existing instructional staff with supplementary project management and a base level of technological skills and effort, noting the study's own limitations due to the necessity of its selection method. The weakness, or rather the areas for improvement, were indicated to be the composition of the graphic design and images and the systematic presentation of content, which had the lowest ranking at 80%, still receiving a Good ranking. The other results were evenly averaged at 87%, indicating a Very Good result, however one with continued room for improvement in relation to quality exposure, the use of colours, the composition of text, audio and video quality, ease of understanding and navigation considerations. Based on the needs assessment, the project was successful in meeting those identified needs which formed the basis of the expert evaluation to validate that the product met the basic expected standard. Future iterations, however, may benefit from a focused attempt to update and improve the images used, and the overall aesthetic features of the application.

In order to determine the effectiveness of the learning tool, the digital CD Rom was used as a supplement in the classroom. Instructors reinforced concepts by providing students with computers and the CD Rom during class time, as well as the potential to sign out a CD Rom with the learning application for those who had access to computers at home or in their local community. The trainers in training students did seem to show improved learning retention using the self-study component with the digital CD training program based on final exam scores in comparison to a control. The student trainers appeared to appreciate the interactive learning elements, as well as the self-assessment and self-determination of how much time to spend on each aspect.

Table 4: Exam results of training students (control group)

EXAM SECTION	Mean score	Median score	Lowest score	Highest score
General questions with short answers	81%	78%	70%	88%
Multiple choices and Yes/No questions	79%	76%	72%	86%
Fill in the blank questions	75%	75%	70%	80%

It is important to have respect for the high achievement which is being met in the traditional classroom, which has shown very satisfactory results. By contrast, the students who had the benefit of using the digital CD Rom scores slightly higher in most areas, as can be seen from the table below. Also, it was possible for the trainer to manage more students than the requisite twelve at the same time, representing a great efficiency in training delivery.

Table 5: Exam results of training students (experimental group)

EXAM SECTION	Mean score	Median score	Lowest score	Highest score
General questions with short answers	82%	83%	72%	100%
Multiple choices and Yes/No questions	80%	80%	76%	100%
Fill in the blank questions	77%	81%	69%	100%

The Wilcoxon-Mann-Whitney test provides a statistical and non-parametric way to determine whether there is a significant difference in repeated measures, such as the scores comparing the experimental group and the controls (Marx, Backes, Meese, Lenhof & Keller, 2016). With regards to the one-tailed test, the EDISON-WMW calculator for this test provided the determination that the p-value was 0.163, which provides evidence that the difference, a value greater than 0.05 means that the samples were significantly different from one another, indicating that a change occurred as a result of the intervention applied to the experimental group. A t-test of the two samples revealed a two-tailed P value of 0.0087, which further supports the statistical significance, with a confidence interval of 95%. The limitations to these more quantitative indicators include, of course, theampling method and the limited class size, which makes the analysis more susceptible to outliers such as perfect scorers.

IV. DISCUSSION

It can be difficult for vocational and other institutions of learning to believe that an in- house attempt at building digital learning materials can be successful, however digital tools and digital literacy have developed in Indonesia to the point where there is evidence that it is possible, and that it can transform access to building skills and higher education (Abud, 2012). Based on the research study there is additional convincing evidence that training in Indonesia and other developing countries could greatly benefit from expanding education initiatives delivered through the computer by CD or online (Osín, 1998). The ADDIE model provided an appropriate framework for designing the digital based training for this example study in the provision of training for the electric power industry (Peterson, 2003). The ideal, based on this study, is the click and deliver access to Indonesian language instruction using digital means. This could have great impacts for the economic growth of the country, as well as creating opportunities in more remote islands of the nation (Naszief, 2000).

For countries such as Indonesia where a massive scale of training delivery and implementation is needed, the development and use of digital based training materials may provide the acceleration for rapid change and improvement in the skills development agenda (Di Gropello et al., 2011). There is also the general implication which is that this format of CD Rom, online, or other digital delivery of training and education can greatly facilitate access to training by reducing the costs. Digital format implementation does not have the need for overhead while also not requiring a greater number of instructions. Ideally, the best instructors in each domain provide the input for the training of future instructors, as well as collaborative efforts to create digital education delivery for students. In this way there is an exponential increase in the availability of skills training opportunities, as well as the development of those persons who will then be able to provide the face to face instruction that leads to mastery of vocational skills. This may also be an approach that can be considered for academic and continuous or lifelong learning. To that end, catalysing and creating interest among instructions as well as institutions in Indonesia would provide for the pre-conditions to such a transformation.

Of course, the need for people who are skilled in WordPress, or JavaScript, HTML, database driven technologies such as PHP and SQL, with high quality skills in interpreting educational materials is a tall order, and this may represent the first area of focus (Blake & Morse, 2016). In this way there can be a progression of exponential skill levels across many areas. The first focus would be the skills needed to rapidly translate and convert print-based materials into a more interactive and digital form. Alternatively, a guided system could be developed as an app to support rapid conversion of print materials, with prompts to teachers or designers in relation to continuous improvement and development.

A major note for the researchers in this study was the importance of Indonesian language supports. In fact, in many cases, free education or training supports, or media that would be a support in the classroom, exists in another language. The development of Indonesian language learning tools to support vocational skills and specialized training has incredible potential to catalyse a work force with skills at a higher level. This could be especially true for those rural population for whom the national Indonesian language is a

barrier to education. The best way to approach this is to have a set of technical specifications as tables that allow for rapid lookup and translation of commonly used phrases and terms in the development of learning templates as well as existing content. While a great effort is necessary, the result can be an explosion of growth in skills training and education for these populations.

As an exploratory study with a very small purposive sample, there were a number of limitations to this study (Price & Murnan, 2004). The sample size of experts and of students was purposive, and very small, and increasing the scale of the sample would lead to a greater level of reliability and validity of the results. Another limitation to this study was the availability of equipment. As a result, this study used a computer and a mouse as the basis for interaction with the digital curriculum, despite increasing interest in the use of tablets.

The development of new digital training materials is in the best interests of vocational schools. Because of the potential for exponential skills development and support across the Indonesian population, including remote communities, there is also a clear opportunity to increase the skill level in developing Indonesian language learning software. The main recommendations are therefore for the increased development of supports for the development of digital,

Indonesian-language based learning programs and modules, as well as the continued research in relation to efficacy of the programs regarding student achievement and student satisfaction with the programs, which provide important counterpart information to the opinions of experts.

These systems were designed for and assessed on computers using a keyboard and mouse for navigation. Given the increasing use of tablets, and their cost efficiency and ease of use, this may indicate that future studies should consider this device as the means for delivery of the instructional material (Mang & Wardley, 2012; Montrieux, Vanderlinde, Schellens & De Marez, 2015; Mulet, Van de Leemput & Amadieu, 2019; Nguyen, Barton & Nguyen, 2015; Palaigeorgiou & Papadopoulou, 2019) It is hypothesized that the use of tablets, rather than tradition computer, mouse and keyboard combinations will greatly support ease of use, student interest and higher performance. Another possibility is the use of smartphones, and this is particularly because many young people in Indonesia have already mastered the use of their smartphone. There are, however, important arguments against the use of smartphones in the classroom, as it can be more difficult to control the devices, and to keep students on task (Anshari, Almunawar, Shahrill, Wicaksono & Huda, 2017).

Further development of digital templates for use in education, as well as the technical specifications that would allow for translation of educational applications between the languages of Indonesia, as well as translation from English, German, Chinese and other languages will allow for the expansion of available digital materials, the quality of education, and language and cultural appropriateness.

V. CONCLUSIONS

This investigation presented the use of the ADDIE model to drive the development of new supports to train the instructors who provide delivery of vocational training in electrical power at the Centre for Industrial Training in North Sumatra, Indonesia has been successful, and the evaluation by experts indicated that a high-quality product was quickly developed. The ADDIE model, aided by the conceptual ideas in grounded theory, provided a focused method for the development of digital training delivery intended for training the trainers. This provides a cost-effective way of rapidly expanding the available labour pool of trainers, in electrical power studies as well as other skill areas and subjects. Not only does this approach have great potential for more rapid learning and retention, it is also more easily disseminated as it does not require a live instructor. Another advantage was that the result was in the Indonesian language, and there are simply not enough educational resources in the Indonesian language. This study provided a detailed example of how to approach the development of a digital instruction model that creates interest for the learner using interactive modules.

In closing, Indonesia, as with other nations in Southeast Asia, wishes to build and develop their economy and their labour force in order to achieve higher quality of life, but to some extent access to the education and skills training needed to achieve this has been a barrier. The development of customized learning application, in the appropriate languages of Indonesia, can provide a supplement to trainers so that they can manage a higher number of learners, and in some cases it may even allow for more independent study. This idea can lead to transformation. While this was just one study and one application of the idea, the practical implications of instituting these ideas at scale could have great and positive impacts over time. Stakeholders are recommended to familiarise themselves with the ADDIE model as well as the principles of grounded theory The successful development of a learning application to support training for trainers in Electrical Power at a vocational school in Indonesia has had positive results, but further research and validation is necessary, for this application and for spreading the concept generally across subject matters and areas. It is recommended that vocational and other institutes of learning in Indonesia and other developed contexts consider the development of customized learning applications as a means of reaching a greater number in the population and transforming access to skills training and learning. The outcomes can be a greater number in the population at a higher level of skills and competencies, as well as a greater competitiveness of the national labour force.

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